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THE SANITATION CONNECTION

by BOB STANLEY

According to a recent study carried out by the World Bank, 25,000 people die every day because of preventable water-related diseases. Most of these people succumbed because their resistance to disease was already weakened by malnutrition. In this way the world's water and sanitation problems are linked to the ever-present threat of food shortages.

But if the problems are linked, then so are the solutions. For centuries the Chinese have used human wastes--"night soil" as they prefer to call it--to fertilize their fields. Indeed night soil is now said to account for one-third of all the fertilizer applied in Chinese agriculture. And around the world scientists are carefully studying the various ways in which excreta can be disposed of not only safely, but productively.

In Thailand researchers at the Asian Institute of Technology are turning human wastes into fish food. Dr. Peter Edwards, head of the Institute's agricultural and food engineering division, believes major cities of Asia, most of which face serious waste disposal problems, may be able to convert significant ammounts of that waste to an organic fertilizer used to produce fish that in turn can be converted to animal feed.

One approach is to use stabilization ponds, which provide a natural and inexpensive form of sewage treatment, but incidentally produce large quantities of algae.

The continuous culture and harvest of microalgae produces protein yields which are more than ten times greater than the yield of soybeans, the most prolific agricultural protein producer. One system employs chemical fertilizers and gaseous carbon dioxide to grow algae but has proved to be commercially feasible only for producing algae as a high-priced health food.

A second system uses wastewater as a source of nutrients, with no addition of

chemicals, with the net result that human wastes are converted into high quality protein, which can be used to feed fish or livestock. Since harvesting the algae has proved expensive, controlled amounts of human wastes are pumped directly into fish ponds, and the harvest of fish is being monitored.

A danger with the direct introduction of sewage into a stabilization fish pond unit is deoxygenation of the water through overloading, which could kill the fish. "I want to regulate the waste, to convert it into fish as well as treat it," says Dr. Edwards.

The main reasons for the fish not being consumed directly by humans are the possibility of disease and social acceptibility. The project is part of a network of similar research projects being supported in Africa, Asia, Latin America, and the Middle East by Canada's International Development Research Centre.

The Centre is also supporting a number of projects aimed at improving sanitation technology -- " re-inventing" the basic latrine. The best prospect, combining low cost, effective destruction of disease-causing organisms, minimal or no use of water, and environmental safety, appears to be the composting latrine.

The composting latrine, in its various forms such as the Vietnamese double vault, the Swedish multrum, the Indian gopuri, or the Chinese "four-into-one" system, operates by retaining human and household wastes under controlled conditions long enough to allow organisms normally present in organic matter to break wastes down into a stable soil-like humus. The process is familiar to any gardener or farmer.

The contents of a properly functioning compost latrine are safe to be removed and buried as soil conditioner after about six months. Most of the harmful parasitic organisms present in excrement have been destroyed, and the bacteria counts reduced to levels normally found in soil.

The techniques are most advanced in China, where they have been used for centuries. In many other countries, however, where there are strong cultural taboos concerning excrement, the reuse benefits are likely to go unrealized for now. But it is sufficient that the composting latrines render wastes safe.

Researchers from the Tanzania National Scientific Research Council (TNSRC) are experimenting with a number of waste disposal systems for rural and urban-fringe areas. The project staff designed, constructed, and installed a total of 66 latrines of three broad types over the course of two years, and monitored their performance. The most successful was the "modified gopuri", an alternating use latrine in which two vaults are created by partitioning a receptacle built of soil, clay, or concrete bricks. One side is used until nearly full, topped up with grass and a layer of

soil, then sealed and allowed to compost while the second vault is used. When the second vault is full, it is sealed and the humus emptied from the first.

"For any system to be successful, it must use the materials or skills that are available in the towns and villages," says Dr. Wen Kilama, principal investigator of the project. "That is why we modified the gopuri so that it could be emptied from the top with a hoe, which is a more common tool in Tanzania than a shovel. Also, some of the original designs used marine plywood plates and covers -- we don't make marine plywood in Tanzania. We started making ferrocement plates with chickenwire reinforcing, and now we're looking into using sisal-reinforced cement." Sisal is a major non-food crop in Tanzania. By the same principles, Dr. Kilama's team eliminated the multrum, much favoured elsewhere, because the composting depends on a carefully angled pit floor that was too difficult to construct under village conditions.

The researchers now know in theory what will work for Tanzania. The active research and development phase of the project is over. Now the theory will be tested as the installations are observed for another two years to see how well they stand up to normal use.

The 1980s have been declared the International Drinking Water Supply and Sanitation Decade. Clean water will do little to improve health unless it is linked to improved sanitation. And the key to better sanitation is appropriate technology, adapted by the local people to meet their specific needs. That such technologies may also provide the means to increase food production is a bonus the hard-pressed developing countries should welcome.

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